Title of Patent

Method and apparatus for cooking raw Chinese Wheat Noodle (either yew mian or chu mian in Mandarin)

Abstract

A method of controlling a noodle cooking basket attached with a pivoted cylindrical stirrer comprises the steps of sensing (1) a selection on a control panel, determining the type of noodles selected, where the type of noodle is one of at least a thin type (Yew mian in Mandarin) and a thick type (chu mian in Mandarin).

Depending on the determined type of noodles, noodle cooking basket attached with a pivoted cylindrical stirrer motion sequence of a first configuration is activated when the determined type of noodle is the thin type and noodle cooking basket attached with a pivoted cylindrical stirrer motion sequence of a second configuration is activated when the determined type of noodle is the thick type.

Claims

1. A method of controlling a noodle cooking basket attached with a pivoted cylindrical stirrer comprising a control panel, AC & Stepper motor assembly, bracket, a water sprayer, a operating tank and a spare tank, the method comprising the steps of : determining a type of noodle being selected, said type of noodle being one of at least a thin egg noodle type and a thick egg noodle type, and depending on the determined type of noodle, activating a noodle cooking basket attached with a pivoted cylindrical stirrer that is hooked on a bracket mounted on stepper motor assembly motion sequence of a first configuration when the determined type of noodle is the thin type and activating a noodle cooking basket attached with a pivoted cylindrical stirrer that is hooked on a bracket mounted on stepper motor assembly motion sequence of a second configuration when the determined type of noodle is the thick type.

2. The method according to claim 1, wherein the ~~first and second~~ motion sequence ~~configurations correspond to a respective first and second motion sequence and wherein the~~ of a ~~first motion sequence~~ configuration is shorter in duration compared to the ~~second~~ motion sequence of a second configuration.

3. The method according to claim 1, wherein the XY motion activated by the AC & stepper motors will drive the mounted bracket where ~~process causes the pendulum motion of the cylindrical stirrer to achieve the optimal stirring of the noodles~~ the cooking basket attached with a pivoted cylindrical stirrer is mounted will cause the stainless steel rod B as shown in figure 15B to swing to and fro like a pendulum.

4. A noodle cooking basket controlled with inputs from a PLC (Programmable Logic Controller or any other computer programmed) terminal determining type of noodles to be cooked, said type of noodles being one of at least thin noodles and a thick noodles.

5. ~~The noodle cooking basket attached with a pivoted cylindrical stirrer according to claim 1, wherein the first and second motion configurations correspond to respective first and second motion timing and wherein the first motion timing is shorter than the second motion timing.~~ (Note : This claim rephrased and subsumed into claims 1&2.)

6. A computer program product comprising readable medium having computer readable software instructions embodied therein, wherein the computer readable software instructions comprise Computer readable software instructions capable of determining a type of noodles having been selected on the control panel, said type of noodles being one of at least a thin noodle and a thick noodle ~~and computer readable software instructions capable of depending on the determined type of noodle, initiate a sequence of motion of a first motion sequence configuration when the determined type of noodle is the thin type and initiating a sequence of motion of a second motion sequence configuration when the determined type of noodle is the thick type.~~

~~Computer readable software instructions capable of depending on the determined type of noodle, initiate cold water shower release at intervals of a first configuration when the determined type of noodle is the thin type and initiating cold water shower release at intervals of a second configuration when the determined type of noodle is the thick type. Computer readable software instructions capable of initiating the release of hot water from the operating tank at specified intervals while at the same time initiate release of clear hot water into the operating tank from the spare tank, thereby keeping the level of hot water in operating tank within prescribed range.~~

~~Computer readable software instructions of initiating the release of cold water into the spare tank to heat up to a minimum temperature of 96 deg C.~~

7. The computer program product according to claim 6, wherein ~~the first and second motion sequence configurations correspond to a respective first and second motion scale and wherein the first motion scale is shorter than the second motion scale~~ computer readable software instructions capable of depending on the determined type of noodle, initiate a motion sequence of a first configuration when the determined type of noodle is the thin type and initiating a motion sequenceof a second configuration when the determined type of noodle is the thick type.

8. The computer program product according to claim 6, wherein ~~the first and second water shower configurations correspond to a first and second temporal scale wherein the first scale is shorter than the second scale.~~ Computer readable software instructions capable of depending on the determined type of noodle, initiate cold water spray onto the cooking basket.

9.. The computer program product according to claim 6, wherein Computer readable software instructions capable of initiating the release of hot water from the operating tank when the pre-set value of a numerical counter is reached while at the same time initiate release of clear hot water into the operating tank from the spare tank, thereby keeping the level of hot

water in operating tank between the top (OP_HH_Level_Sw as defined in Fig.12) and middle (OP_H_Level_Sw as defined in Fig.12) float switches.

10. The computer program product according to claim 6, wherein Computer readable software instructions capable of initiating the release of cold water into the spare tank to heat up to a minimum temperature of 96 deg C.

Description

Field of the Invention

The present invention relates to a method for controlling a noodle cooking basket attached with a pivoted cylindrical stirrer and a computer program performing such a method. One of the embodiment of this invention relates to cooking wanton noodles (Cantonese egg noodles) using the motion of the noodle cooking basket attached with a pivoted cylindrical stirrer to stir the noodles to ensure the characteristic springy on the outside and well cooked on the inside noodle texture.

Background

To date, to cook raw wheat based noodles like wanton noodles to perfection requires an experienced cook with years of experience, to produce noodles with springiness on the outside and thoroughly cooked through on the inside. There are 4 processes that helps to achieve this result, namely (a) continuous stirring and spreading of noodles between temperatures of 96-98 deg Celsius to prevent sticking and lumpy noodles (b) Cold water treatment to reduce the surface temperature of the cooked noodles so that the outside will achieve the springiness while the inside continues to cook through (c) cooking duration (d) ensuring that the cooking water remains clear as opposed to high viscosity.

Looking at the prior art in cooking the noodles, experienced cooks normally fire up the temperature of the water to a rolling boil representing close to 100 deg Celsius, they will then either drip down or add a ladle of room temperature water to still the water surface (effectively bringing it down to between 96-98 deg Celsius), before throwing in the noodle. After stirring and spreading the noodle in the hot water for a predetermined number of seconds, the almost cooked noodles are transferred to a room temperature water bath (which have to be changed regularly due to its rising temperature). This will cool down the surface of the noodles, while the noodle interior continues to be cooked. The noodles are transferred back to the hot water to reheat up the noodles surface. This ensures that the noodles are springy on the outside and thoroughly cooked on the inside. In addition, experienced cooks will change the cooking water regularly to keep it as clear as possible.

Summary of the Invention

An object of the invention is to design a noodle cooker that achieves the following:-

1. Constant temperature range between 96 – 98 deg Celsius;
2. Constant stirring of noodles to prevent sticky and lumpy noodles;
3. Room temperature water treatment of the noodles to lower the surface temperature of the noodles in order to achieve the springy on the outside and cooked through on the inside texture;

4. Regular hot water change to ensure clear boiling water;
5. Constant water addition to compensate for evaporation and achieve overflow that removes the foam floating at the top of the water

Hence, in a first aspect there is provided a method for controlling a noodle cooking basket attached with a pivoted cylindrical stirrer. The method comprises the steps of tapping a selector switch, determining a type of noodle to be cooked, where the type of noodle is one of at least a thin type and a thick type. Depending on the determined type of noodle, motion sequence of a first ~~motion~~ configuration is initiated when the determined type of noodles is the thin type and a motion sequence of a second ~~motion~~ configuration is initiated when the determined type of noodle is the thick type.

In another aspect there is provided a method for controlling the release of room temperature water onto the almost cooked noodles in the midst of cooking to cool down the surface temperature of the noodles.

In another aspect there is provided a method for controlling the release of the thickening water from the operating tank and adding an equal amount of hot water of at least 96 degrees Celsius from the spare tank at regular intervals. Thereafter, water is added to the spare tank from a water inlet to be heated up to be ready for the next release.

Brief description of the Drawings

Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not drawn to scale, and wherein Fig 1 shows an overview of how the machine looks like.

Fig. 2 shows schematically a block diagram of the controller according to one embodiment of the present invention.

Fig 2A shows the controller block diagram in detail

Fig. 3 is a flow diagram illustrating a number of steps of a method according to one embodiment of the present invention.

Fig. 4 illustrates the detail flow of the operation of the method of fig. 3

Fig. 5 shows the assembled noodle cooking basket attached with a pivoted cylindrical stirrer.

Fig. 6 shows the schematic drawing for the operating tank and spare tank.

Fig 7 shows the overall assembly of the motor driving the mounted bracket

Fig 8 shows the stepper motor assembly that controls the horizontal motion

Fig. 9 shows the bracket that will be mounted on the stepper motor assembly. The noodle cooking basket attached with the pivoted cylindrical stirrer as shown in Fig 5 will be hooked to the hooked end of the bracket. All these when assembled will be as in Fig. 10.

This bracket and hence the noodle cooking basket attached with the pivoted cylindrical stirrer will move back and forth horizontally as the stepper motor moves the 2 shafts labelled S as shown in fig 8.

Fig 11 & Fig 11a shows the I/O block diagrams and schematic drawings.

Fig. 12 illustrates the connections for the PLC controller

Fig. 13 illustrates the stepper motor interface PCB whilst Fig. 13a illustrates the stepper motor circuit

Fig. 14 & Fig 14a illustrates the power supply circuitry.

Fig. 15A shows the construction noodle cooking basket & fig 15B shows the assembly of the pivoted cylindrical stirrer

Detailed Description of the Invention

The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some examples of the embodiments of the invention are shown. Indeed, these inventions may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein, rather, these embodiments are provided by way of example so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

Fig. 2 illustrates schematically an operator interface (0) in which an embodiment of the present invention is implemented. The interface comprises a PLC circuit as well as input/output units in the form of a touch screen control & display (1), ~~mechanical armed~~ bracket driven by a stepper motor with controller (3), noodle cooking basket attached with a pivoted cylindrical stirrer (4) and solenoid valves (5a & 6a) as shown in Fig. 1

The method according to the present invention will in general reside in the form of software instructions, together with other software components necessary for the operation of the interface, in the memory of the interface.

Turning now to Figs 3 and 4, a method according to one embodiment of the invention will be described in terms of a number of steps to be taken by controlling software in an interface such as the interface (0) described above in connection with Fig. 2

The exemplifying method starts at a point in time when a touch action, for example tapping performed on the touch screen control & display (1) is sensed by the sensors input (2). Depending on the input selected, the controller (3) will send instructions on the motion sequence configuration to motor control output (4), said motion sequence configuration corresponding to the various noodle types. The controller (3) will lower the noodle cooking basket (4) vertically into the operating tank of boiling water (5) and starts to move in a horizontal motion. This horizontal motion will ~~initiate~~ cause the ~~pendulum motion of the~~ pivoted cylindrical stirrer in the basket to ~~stir the noodles~~ move in tandem like a pendulum.

After the specified duration, the noodle cooking basket attached with a pivoted cylindrical stirrer (4) is lifted out of the operating tank (5) and room temperature water is showered on the noodles from water spray (4a), the noodle cooking basket attached with a pivoted cylindrical stirrer (4) moving horizontally all the time, stirring and spreading the noodles. The noodle cooking basket attached with a pivoted cylindrical stirrer(4) is lowered once again into the operating tank (5) for another specified duration to reheat the surface of the cooked noodles, after which the noodle cooking basket is restored back to its start position, completing the cooking process.

Fig 6 shows the schematic diagram of the operating and spare tanks. The temperature in the operating tank (5) is maintained between 96 -98 deg Celsius through the use of thermocouple, which will cut out heating at 98 deg Celsius and restart reheating when the temperature drops to 96 degree Celsius. An additional safeguard to prevent noodles being cooked at temperatures below 96 degree Celsius, controller (3) will check whether the prevailing temperature of operating tank (5) is at least 96 deg Celsius before initiating motion sequence.

The numerical counter controlling water release is incremented by one, which is then compared with a pre-set value. If it matches, solenoid valve (5a) located on the operating tank (5) will be turn on to discharge ~~a pre-determined amount of~~ water until the middle (OP_H_Level_Sw) float switch is reached. At the same time, solenoid valve (6a) located on the spare tank (6) will also turn on to discharge an equal amount of hot water into operating tank (5).

All of the below are newly added explanations of the terms used above

Definitions

Motion sequence refers to the sequence of XY motions controlled by the 2 motors. The stepper motor controls the horizontal movement while the AC motor controls the up/down motion.

Motion sequence refers to the motion sequence as defined above executed in the following sequence :-

i. the AC motor will move the assembly as shown in fig 8 down and stay there;

ii. the 2 shafts labelled as S in figure 8 will be moved by the stepper motor horizontally for a pre-set value x (set at the HMI via software according to claim 6) number of seconds and stops;

iii. The AC motor will move the assembly as shown in figure 8 up to original position and stay there;

iv. the 2 shafts labelled as S in figure 8 will be moved by the stepper motor horizontally for a pre-set value y (set at HMI via software according to claim 6) number of seconds and stops.

v. At the same time as iv, solenoid valve controlling cold water spray is opened for y number of seconds and stops;

vi. the AC motor will move the assembly as shown in figure 8 down and stay there;

vii. the 2 shafts labelled as S in figure 8 will be moved by the stepper motor horizontally for a pre-set value z (set at HMI via software according to claim 6) number of seconds and stops;

viii. the AC motor will move the assembly as shown in figure 8 back to its original starting position and stops, completing the whole sequence.

Motion sequence of a first configuration corresponds to pre-set values of x1,y1,z1 while motion sequence of a second configuration corresponds to pre-set values of x2,y2,z2 as described under motion sequence whereby x2,y2,z2 is greater than xi,y1,z1.

Pivoted Cylindrical stirrer refers to a stainless steel cylinder of 50mm length and 3omm diameter that is pivoted by way of eyelet joining 2 stainless steel rods rods of 5mm as shown in fig. 15B. This whole assembly is then soldered onto the cooking basket and the end product is the noodle cooking basket attached with the pivoted cylindrical stirrer as shown in fig 5.